

What is claimed is:

1 1. A method of forming a shallow trench isolation,  
2 comprising steps of:  
3 forming a plurality of trenches in a semiconductor  
4 substrate;  
5 forming an oxide liner on the bottom and sidewall of each  
6 trench; and  
7 thermal annealing in a nitrogen-containing atmosphere to  
8 dope nitrogen elements in the oxide liner, wherein a  
9 nitrogen-rich layer is formed at the interface between the  
10 oxide liner and the semiconductor substrate.

1 2. The method according to claim 1, wherein the  
2 nitrogen-containing atmosphere comprises  $N_2$ ,  $NH_3$ ,  $N_2O$ , nitric  
3 oxide or any nitrogen-containing compound.

1 3. The method according to claim 1, wherein the thermal  
2 annealing is performed at 650~850°C, 100~250 mtorr, for 1~30  
3 minutes.

1 4. The method according to claim 1, wherein the oxide liner  
2 is formed by thermal oxidation.

1 5. The method according to claim 1, wherein the trenches  
2 are formed by anisotropical dry etch.

1 6. The method according to claim 1, further comprising  
2 steps of:  
3 depositing an insulating layer on the entire surface of

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4 the semiconductor substrate to fill the trenches; and  
5 using chemical mechanical polishing (CMP) to planarize  
6 the insulating layer to reach the top of the semiconductor  
7 substrate.

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